

What is claimed is:

(Claim 1) 1. A phase shift photomask, comprising:
a transparent substrate;
at least one isolated linear pattern on the substrate, including a transparent end portion with a phase shift of 180° relative to the substrate;
a plurality of dense linear patterns on the substrate; and
a transparent phase shift region, located on the substrate adjacent to ends of the dense linear patterns and having a phase shift of 90° relative to the substrate.

(Claim 2) 2. The phase shift photomask of claim 1, wherein the substrate comprises quartz or glass.

(Claim 3) 3. The phase shift photomask of claim 1, wherein the dense linear patterns and the isolated linear pattern except its transparent end portion comprise opaque linear layers.

(Claim 4) 4. The phase shift photomask of claim 1, wherein the dense linear patterns and the isolated linear pattern except its transparent end portion comprise semi-transparent linear layers with a phase shift of 180° relative to the substrate.

(Claim 5) 5. The phase shift photomask of claim 1, wherein the transparent end portion of the isolated linear pattern and the transparent phase shift region comprise recessed portions of the substrate.

(Claim 6) 6. The phase shift photomask of claim 1, including a pair of opposite isolated linear patterns with their transparent end portions facing each other.

(Claim 7) 7. The phase shift photomask of claim 1, wherein the dense linear patterns include two groups of dense linear patterns separated by the transparent phase-shift region, wherein the ends of the dense linear patterns in each group are adjacent to the transparent phase-shift region.

(Claim 8) 8. A phase shift photomask, comprising:
a transparent substrate; and
an isolated linear pattern on the substrate, including a transparent end portion with a phase shift of 180° relative to the substrate.

(Claim 9) 9. The phase shift photomask of claim 8, wherein the substrate comprises quartz or glass.

(Claim 10) 10. The phase shift photomask of claim 8, wherein the isolated linear pattern except its transparent end portion comprises an opaque linear layer.

(Claim 11) 11. The phase shift photomask of claim 8, wherein the isolated linear pattern except its transparent end portion comprises a semi-transparent linear layer with a phase shift of 180° relative to the substrate.

(Claim 12) 12. The phase shift photomask of claim 8, wherein the transparent end portion of the isolated linear pattern comprises a recessed portion of the substrate.

(Claim 13) 13. The phase shift photomask of claim 8, including a pair of opposite isolated linear patterns with their transparent end portions facing each other.

(Claim 14) 14. A phase shift photomask, comprising:
a transparent substrate;
a plurality of dense linear patterns on the substrate; and
a transparent phase-shift region, located on the substrate adjacent to ends of the dense linear patterns and having a phase shift of 90° relative to the substrate.

(Claim 15) 15. The phase shift photomask of claim 14, wherein the substrate comprises quartz or glass.

(Claim 16) 16. The phase shift photomask of claim 14, wherein the dense linear patterns comprise opaque linear layers.

(Claim 17) 17. The phase shift photomask of claim 14, wherein the dense linear patterns comprise semi-transparent linear layers with a phase shift of 180° relative to the substrate.

(Claim 18) 18. The phase shift photomask of claim 14, wherein the transparent phase-shift region comprises a recessed portion of the substrate.

(Claim 19) 19. The phase shift photomask of claim 14, wherein the dense linear patterns include two groups of dense linear patterns separated by the transparent phase-shift region, wherein the ends of the dense linear patterns in each group are adjacent to the transparent phase-shift region.

